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SOVIET BATTERY RECEIVERS

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The development of mass radiofication of rural kolkhozes requires immediate and satisfactory action on the ever-growing demand for cheap, reliable, and economical battery receivers. Up to the present, however, the radio industry has produced only one receiver supplied by battery, the Rodina radio. This radio meets none of the above requirements. The industry is now starting manufacture of a new battery receiver, the Iskra. Obviously, one new model alone cannot satisfy the demands of rural kolkhozes.

In this connection, the experience of recent years in the production of AC receivers is very significant. Immediately after the war the industry developed mass-production methods for receivers, especially second-class receivers. Radio listeners were given a wide choice of radios of this class: the Vostok, Pioneer, Ural, VEF-557, Salvut, etc. The only third-class receiver put out at that time was Rekord. Experience showed that this ratio between types of receivers did not correspond to consumers' demands. The greatest demand was for the Rekord. It was therefore to be expected that, in view of this demand, the industry would start mass production of cheap models in 1949. At present, a listener in an electrified locality can procure the kind of good, cheap radio he wants. The shops have in stock the small, attractive Moskvich and the ARZ-49 receivers which have certain electrical and accoustical improvements. The latest model of the Rekord is likewise in stock. The Rekord also answers the requirements of customers in localities served by DC networks.

Beside the above receivers, the industry is putting out a number of others, such as the T-755, Minsk-S-4, and VV-662, midway between the second and third classes in electrical features and price and the latest models of second class receivers, including simple radio-phonographs, like the Ural-49. In addition, various first-class receivers, e.g., the T-689, Leningrad and Neva, will be produced.

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It is evident that the rural radio listeners who use battery receivers should also be able to select the type of receiver they need. For this purpose, at least three types of battery receivers are absolutely necessary: a cheap receiver, a third-class receiver, and a receiver approaching the second-class type. The radio industry can easily turn them out since the main requisite for such sets -- mass-produced economical battery tubes providing higher power efficiency -- is already being solved.

A Rodina-type receiver, designed for the new tubes, should be added to the list of second-class receivers. It would consume half the heater power used by the Rodina and two thirds as much for plate supply. Moreover, the one-battery unit (BN5-MVD-500 and BS-70) now used to feed the Rodina will provide a continuous supply for the new receiver for more than a year.

First of all, it is necessary to begin manufacture of a simpler and cheaper receiver (perhaps even with fixed tuning) to receive local stations. Such a receiver could have only two tubes, for example, a 2P1P and 1K1P, in which case the total heater current would amount to 180 milliamps, and the plate circuit current would be less than 5 milliamps. This type of receiver would guarantee reliable reception from local long and medium wave stations.

In our opinion, it is possible to take as a basis for such receivers the two-tube, two-band (B-912) turned RF battery receiver developed by the "Radiotekhnika" Plant. Tests of this receiver, assembled on a very simple, reliable O-V-1 circuit, have shown that it has all the requisites for this type of receiver. While measurements were in progress, the most serious objection to a regenerative circuit disappeared, since it became evident that the receiver radiation in the antenna, when crossing the threshold of oscillation, was very small in actual practice. The receiver sensitivity guarantees reliable reception from central broadcasting stations in zones where the field intensity exceeds one millivot per meter.

We feel that there are no grounds for another objection made to the regenerative circuit -- that control of such a receiver is too complicated because of the presence of the feedback knob. In the first place, the process of tuning the receiver to a station even on the intermediate band is obviously simpler than tuning the Rodina in the short-wave band. Moreover, the fact that such a receiver can receive only two or three stations must be considered. In the second place, prewar experience with a mass-produced receiver -- the SI-235 -- proved that a very wide circle of radio listeners was able to cope with feedback control. In the third place, good detailed instructions, which should accompany any receiver, will aid in overcoming any difficulties which may arise when the owner first uses it. After a week or so he will remember the position of the feedback knobs.

This type of receiver is remarkable for its economy and reliability as well as for its low price. As a matter of fact, it will continue to operate even if the heater voltage drops to 0.7 volts and the plate voltage of 20-30 volts. Consequently, it is possible to get along without a filament rheostat and make full use of the battery capacity. This problem is one of the most important of these connected with the operation of battery receivers.

To give a complete picture, let us set down the approximate technical characteristics of the B-912 receiver.

Sensitivity -- not less than 4 mv

Selectivity for plus or minus 10 kc detuning -- not less than 15 db

Frequency response, plotted by sound pressure (fidelity curve) -- covers the 150-3,500 cycle band with a variation of 16 db

Output power -- 70 mw when harmonics do not exceed 15%

Range of volume control -- 40 db

Supply Specifications:

Heater circuit -- 1.2 v (with possible variation from 1.4 to 0.9 v); current 180 ma

Plate circuit -- 80 v (with possible variation from 90 to 40 v); current, 5 ma

The technical aspects of a third-class battery receiver do not give rise to any special differences of opinion. The Iskra-type receiver in process of manufacture is such a receiver. It is a two-band superhet with 1A1P, 1K1P, 1B1P, and 2P1P tubes. Its output is 150 microvolts when the harmonics are not greater than 15 percent. Other features include:

Sensitivity -- not less than 400 microvolts

Selectivity for 10-kilocycle detuning -- over 15 db

Image channel attenuation -- of the order of 20 db

Volume control range -- 40 db

Automatic sensitivity control factor: when the incoming signal changes 20 times, the output voltage will not vary more than 10 db (not more than three times)

Supply Specifications:

Heater circuit -- 1.2 v (possible deviations between 1.4-0.95 v); current, 300 ma

Plate circuit -- 90 v (possible deviations between 100 and 60 v) quiescent current, 5 ma

Average operating current -- 8 ma

The industry will manufacture a special battery unit to supply the Iskra receiver. During the whole operating period, the working voltage of the filament battery of this unit should not drop below 0.95 volts, i.e., not exceeding the limits of permissible deviation from the normal rating. For this reason no provision has been made for a filament voltage indicator, for a filament rheostat, or for a special dropping resistor. This seems unreasonable to us. Experience in operating Rodina-type receivers has shown that its weakest point is the lack of a voltmeter or some other type of filament voltage indicator, as well as the lack of a rheostat. This is the primary cause of the rapid burnout of the tubes. Moreover, it makes it impossible to utilize fully the capacity of the filament battery. So it seems that the new galvanic cells of the MVD type planned by the industry, even after a drop in their voltage rating, cannot be fully discharged. They could, perhaps, continue in operation if an additional cell were connected. But to accomplish this, it is necessary to have a voltage indicator and rheostat.

As is known, dry cells give off less than half their capacity at the moment when the voltage drops to 0.95 volt, and it is only when the voltage rating falls below 0.75 volt that their capacity can be considered fully utilized. We, therefore, feel that it is absolutely necessary to put some very simple filament voltage indicator as well as a rheostat into the Iskra receiver. This addition would greatly improve the operational characteristics of the receiver.

Together with third-class, mass-produced, cheap receivers, it is necessary to manufacture a battery receiver closely approaching a second-class radio. It is doubtless possible to modernize the Rodina radio so that it can use miniature tubes. The receiver should be planned for use in village reading rooms, clubs, and kolkhoz administrations. Hence, it should have the same supply specifications as the Rodina, but with greater output power. Possibly a record player should be added with spring-driven motor. The demand for such an addition is confirmed by many letters from Radio subscribers asking how to adapt the Rodina for record-playing.

Designs for this type of radio should provide for switching to reception of local stations and for simultaneous change to an economical means of supply; this would make the receiver far more economical. Obviously, the receiver will be tuned to local stations most of the time; and the supply for it can be very economical since two or three tubes could be cut out of the circuit.

A portable Efir-type receiver is also needed. Our radio industry can certainly manufacture this type of receiver and the batteries for it. Such a receiver is in great demand not only among the rural population, but also among city people.

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